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12) **Patent:**

(11) **CA 936501**

(54) **AUTOMATIC UNIT-DOSE DISPENSER**

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**ABSTRACT:**

**CLAIMS:** Show all claims

\*\*\* Note: Data on abstracts and claims is shown in the official language in which it was submitted.

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This invention relates to a dispensing device and more particularly to a controlled unit-dose dispensary.

In large institutions such as hospitals, the dispensing of drugs in individual dosage form to each patient is laborious and time consuming. Furthermore, with certain drugs, for example, hallucinatory drugs, there is a greater probability that the patient will receive only a fraction of the dosage, medically prescribed, the other portion finding its way into the illicit drug trade.

The invention therefore achieves reduction of the laborious, twenty-four hour a day duties of a pharmacist, in preparing individual dosages of drugs for each patient - request. The invention also achieves a more uniform and expeditious method of handling drugs than has hitherto been the practice.

5/24 ✓  
The invention therefore contemplates, in a unit-dose dispensing device for dispensing unit-dose quantities of pharmaceutical preparations in accordance with a pre-coded instruction member compatible with the device wherein the pre-coded instruction member includes regions on the member representative of instruction codes as to at least the quality and quantity of the drug and patient identification, said device comprising,

- (a) means for receiving said instruction member,
- (b) a plurality of sensing means adapted to sense the regions of said instruction member for said code,



- 10
- (c) logic means associated with the sensing means for determining the said codes, the drug quality and quantity prescribed by said instruction means;
  - (d) a hopper within the dispenser communicating to the exterior thereof and having therein a transfer region,
  - (e) a plurality of racks carried by said hopper, each rack carrying an openable closable mechanism at the bottom thereof adapted to constrain in said rack a plurality of containers,
  - (f) activation means for activating the sensor means, logic means, and mechanism whereby the regions are sensed for the codes representative of the quality and quantity as interpreted by the logic means which thereupon activates the mechanism of the appropriate rack and the appropriate containers are thereby released into the hopper and carried thereby to the transfer region.
- 20

The embodiments of the present invention will now be described by way of example, with reference to the accompanying drawings in which;

30 Figure 1 is a perspective of a unit dose dispensing device.

Figure 2 is a side elevation of a portion of the unit dose dispenser carrying the sensing means in its operational position and associated however.

Figure 3 is a front elevation of figure 2 with the sensing means being disposed in the servicing

position,

Figure 4 is a plan view of a pre-coded instruction member.

Figure 5 is an exploded plan view of a sensing figure of the sensing means.

Figure 6 is a side elevation of a hopper.

Figure 7 is a front view of the hopper of figure 6.

Figures 8 and 9 are diagrammatic representations of the mechanism depending from the hopper permitting release of a container element.

Figure 10 is a top view of the hopper of figure 6.

Figure 11 is a schematic of a typical logic circuit.

Referring to figures 1, 2 and 3 the unit dose dispensing device 20 includes a housing 22 and a hinged lockable top 24 having locking means, for example, tumbler and lock key 25, to secure the interior of the housing 22. Within the housing 22 a dispensing region 26 disposes therein a plurality of racks 27 and 28 in parallel rows carried by or disposed above a hopper 29. The hopper 29 includes inclined collection walls 31 merging into a chute 32 with the lower terminus 33 disposing thereat a transfer region 34 from which unit dose containers 35 and 36 may be removed as by hand. The containers may be square shaped 35 or cylindrical shaped 36 as may be convenient for the unit dose of pharmaceuticals which they are to contain. Accordingly, the dispensing rack 27 and 28 which hold the containers in stackable arrays carry therein vertical guides 50 to constrain the containers in the racks for automated

dispensing.

4/12 ✓ Referring to figures 6 and 7 the rectangular rack 27 includes a pair of vertically flanged rear support members 51 adapted for releasing engagement in the rack carrying device 52 affixed to the interior housing 22 which disposes the lower extremity of the rack above the hopper 29. More particularly, the rack carrying device 50 consists of two parallel vertically disposed slot guides through which a portion of each flanged support member 51 racingly engages. This permits removal of the rack for servicing. The rack further includes three horizontal vertically disposed support frames 52, 53 and 54. The support frames carry within the front portion thereof four flanged guides 56 in vertical position. The guides 56 constrain the square containers 35 in a stackable array 59. Depending from the guides 56 is a horizontal sub-frame 58 which among other things holds rigid the guides 56 at their lower extremity. The sub-frame 58 together with the lower two horizontal support frames 53 and 54 also serves to carry an ejector mechanism 60 for causing only the bottom container 31' to be removed from the array 59 and to be released, by gravity, into the subjacent hopper 29. The ejector mechanism 60 includes oppositely disposed pivot arms 65 with lower fingers 66 and upper snugging device 67 which conveniently is a sponge rubber pad or the like adapted to frictionally engage the container 31'' super-adjacent the bottom container 31'. In the rest position, figure 8, the fingers 66 grip around the lower edges of the container 35' while the sponge pad 67 just clear the sides of the container 31''. In the eject position, figure 9, the arms 65 are

rotated outwards and the sponge rubber pad 67 frictionally engage the sides of the container 35'' while the finger 66 clear from the bottom of the container 35' and the same is released thereby into the hopper 29.

10 The pivot arm 65 are activated by an electro magnet 70, secured to a side of two lower support frames 53 and 54. A lever mechanism 75 converts the linear movement of the arm 72 of the electro magnet 70 to the pivotable movement for the arms 65. The lever system includes a motion transfer axis 80 with two axially disposed transfer bars 81 and 82. Bar 81 interconnects by a swing lever 83 to the armature 72 of the electro magnet. The second transfer bar 82 has each extremity levers by connecting rods 84 to motion arms 86 connected to the pivoting arms 65. Linear movement of the armature 72 is transferred to the bar 81 which causes transfer axis 80 to rotate and hence the extremities of bar 82 swing through a partial arc and thereby respectively pull the connecting rod 84  
20 and motion arms 86 to cause the pivot arms 65 to opposingly rotate and swing the fingers 66 from engagement of the bottom of the container 35' and hence release that container into the hopper 29 as hereinbefore described.

In order to ensure positive fingering of the bottom container 35, during rest, pivoting arms 65 are placed under urging force as by coil spring 89 stretchingly connecting between the sub-frame  
30 58 and swing lever 83.

The appropriate electro magnet 70 is activated by means which will now be described.

Referring to figures 1 to 3, the interior of the housing 22 includes adjacent to the hopper 29 a sensing means 85 with a pivoting hinged sensing table 90 carrying a plurality of sensing fingers 91 and a stationary anvil table 92, disposed between the two tables an orificed screen 93. Orifices 94 in the screen 93 are in register with the retracting sensing fingers 91 so that as the sensing table 90 is caused to be disposed against the screen 93 (during  
 10 sensing) the sensing fingers 91 protrude through the orifices 94 to sense regions 99 of the instruction member for example, sensing card 100 of figure 4.

The hinged sensing table 90 is pivoted toward the screen 93 and anvil table 92 when the sensing electromagnets 94 are activated as when the sensing button 96 on the control of the device is activated.

In operation the sensing card 100 is coded  
 20 104 by manually punching out a selected region or regions 99 of the card, whereby the quantity and quality of drug prescribed is recorded thereon. The punched card 100 is inserted into the unit-dose dispensing device 20 by inserting the card through slit 102; the card is thus held between the anvil table 92 and orificed screen 93. The activation button 96 is pressed on the control of the dispenser 20 and the electromagnets 94 are activated by the button.

30 The sensing fingers 91 protrude through the screen 93 and when the regions 99 of the card 100 have been removed the sensing fingers likewise protrude through the cards; otherwise, they retract, the



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retracting fingers 91 close a switch (not shown)  
to activate the electromagnet 70 in the logic  
circuit of figure 11.

By judicial selection of the types of  
pharmaceutical preparations disposed in the plurality  
of racks a number of pharmaceutical preparations can  
be dispersed automatically by use of the coded card  
100. Further, for security and recording purposes,  
10 the card once used could fall to a collection chamber  
115.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. In a unit-dose dispensing device for dispensing unit-dose quantities of pharmaceutical preparations in accordance with a pre-coded instruction member compatible with the device wherein the pre-coded instruction member includes regions on the member representative of instruction codes as to at least the quality and quantity of the drug and patient identification, said device comprising,
  - (a) means for receiving said instruction member,
  - (b) a plurality of sensing means adapted to sense the regions of said instruction member for said code,
  - (c) logic means associated with the sensing means for determining the said codes, the drug quality and quantity prescribed by said instruction means,
  - (d) a hopper within the dispenser communicating to the exterior thereof and having therein a transfer region,
  - (e) a plurality of racks carried by said hopper, each rack carrying an openable closable mechanism at the bottom thereof adapted to constrain in said rack a plurality of containers,
  - (f) activation means for activating the sensor means, logic means, and mechanism whereby the regions are sensed for the codes representative of the quality and quantity as interpreted by the logic means which thereupon activates

the mechanism of the appropriate rack and the appropriate containers are thereby released into the hopper and carried thereby to the transfer region.

2. The device of claim 1 wherein the racks are rectangular.

3. The device of claim 1 wherein the racks are circular.

4. The device of claim 1 wherein the racks carry a plurality of containers in superadjacent relation.

5. The device of claim 1 wherein the openable closable mechanism includes an electromagnetically operated pivoted lever with lower grasping finger and on upper snugging device whereby during its open position the snugging device makes frictional control with the container in which is superadjacent the bottom-most container and the fingers release their engagement of the said bottom-most container whereby the same falls from the rack by gravity into the hopper.

6. The device of claims 1, 4 and 5 wherein the instruction member is a card having sensing regions thereon one of which said regions is removed.

7. The device of claims 1, 4 and 5 wherein the activator means is a button.



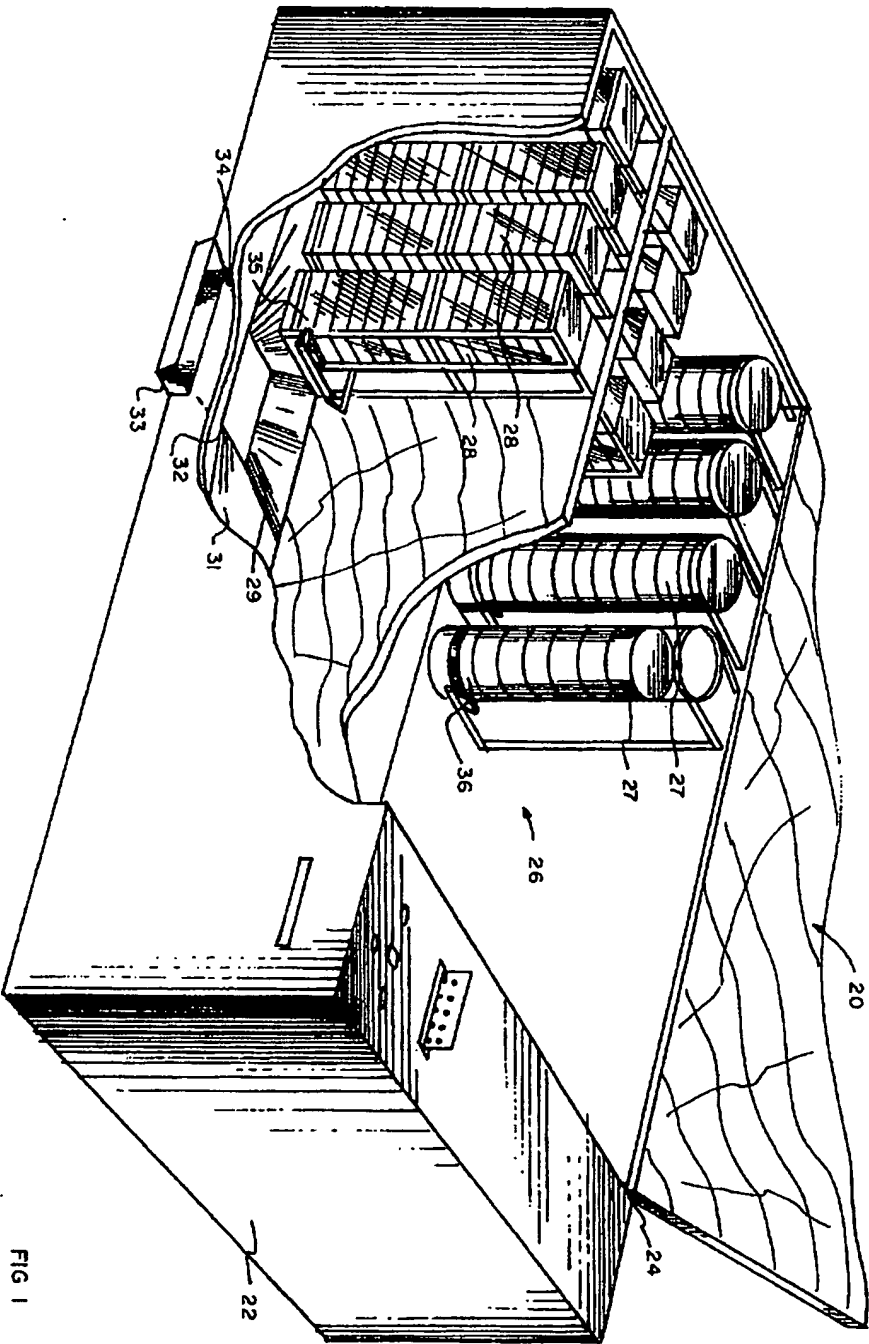


FIG 1

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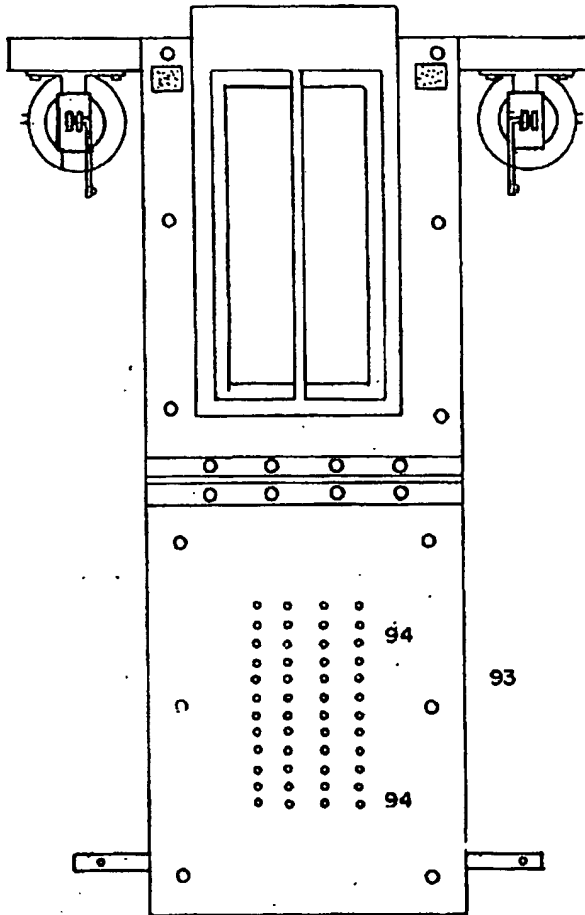


FIG 3

DATE		WARD	
NAME		No.	
Dt.			
DOSE	O.D.		
	B.I.D.		
	T.I.D.		
	Q.I.D.		
1 ●	13 ●	25 ●	37 ●
2 ●	14 ●	26 ●	38 ●
3 ●	15 ●	27 ●	39 ●
4 ●	16 ●	28 ●	40 ●
5 ●	17 ●	29 ●	41 ●
6 ●	18 ●	30 ●	42 ●
7 ●	19 ●	31 ●	43 ●
8 ●	20 ●	32 ●	44 ●
9 ●	21 ●	33 ●	45 ●
10 ●	22 ●	34 ●	46 ●
11 ●	23 ●	35 ●	47 ●
12 ●	24 ●	36 ●	48 ●

FIG 4

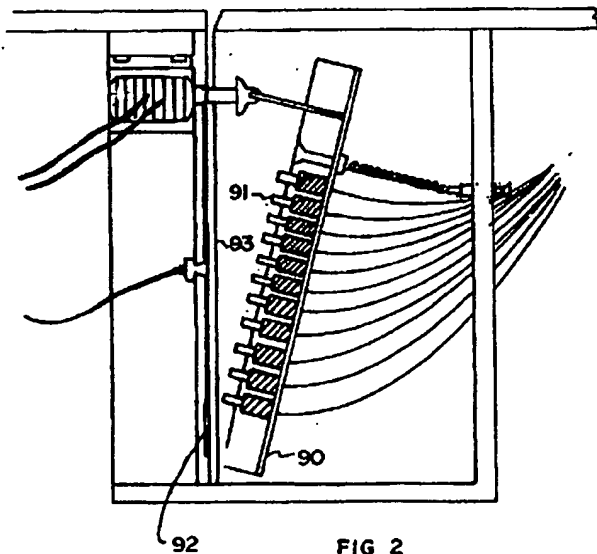


FIG 2



FIG 5

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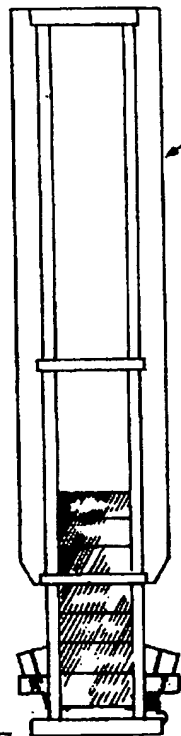


FIG 6

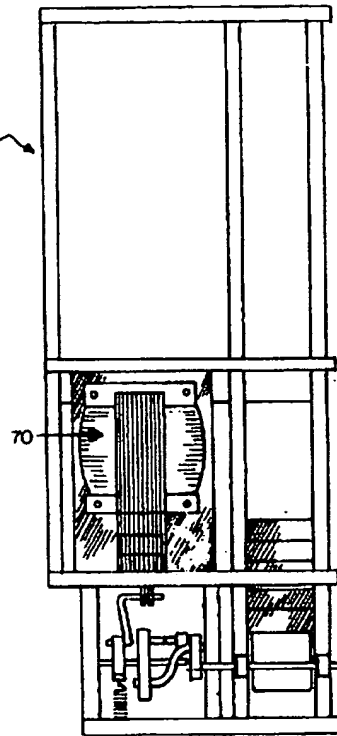


FIG 7

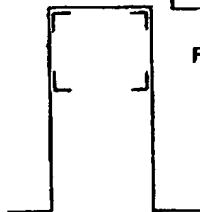


FIG. 10

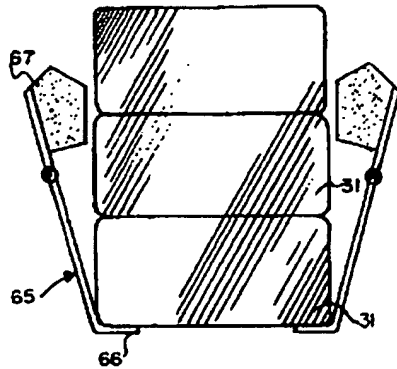


FIG 8

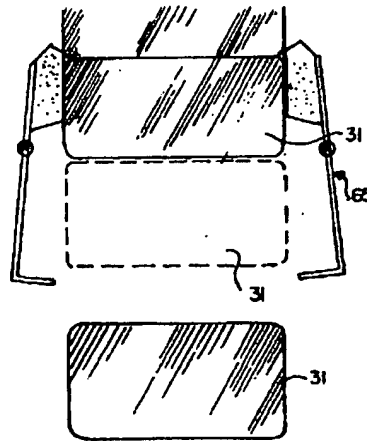


FIG 9

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